3 DESCRIPTION OF THE PROPOSED HARBOUR FACILITIES

3.1 Key characteristics of the proposed scheme and details of the construction phase

Introduction

3.1.1 This section describes the key characteristics of the proposed scheme and its construction. As set out above, the proposed scheme comprises:

- a conveyor system between the port terminal and the MHF at Wilton[1];
- product storage facilities (surge bins) adjacent to a quay and ship loaders on the quay;
- a port terminal (i.e. quay) on the southern bank of the Tees estuary; and,
- capital dredging (i.e. deepening beyond the current maintained depth) of a section of the approach channel and to create a berth pocket to allow the maximum design vessels proposed access to the port terminal.

3.1.2 The conveyor system would be installed within a conveyor route envelope, illustrated on **Drawings PB1586-SK1040 - PB1586-SK1046** (southern envelope) and **PB1586-SK490 - PB1586-SK497** (northern envelope) (included below). Further detail regarding the conveyor system and the routing options considered in this ES is provided below.

3.1.3 There is a requirement for facilities adjacent to the quay to temporarily store product that is delivered via the conveyor system (surge bin). It is proposed that two surge bins would be constructed for this purpose. These surge bins would be located along the landside frontage and will be located as shown on **Drawing PB1586-SK1046** (southern route) or as shown on **Drawing PB1586-SK497** (northern route), depending on which conveyor routing option is progressed..

3.1.4 Two options are being considered for the quay construction – an open quay structure and a solid quay structure. These options are shown on **Drawings PB1586-SK93** and **SK91** respectively. In both cases, the development of the port terminal would be undertaken in two phases to provide the necessary export facilities that mirror the predicted increase in production from an initial 6.5mtpa to 13mtpa of product.

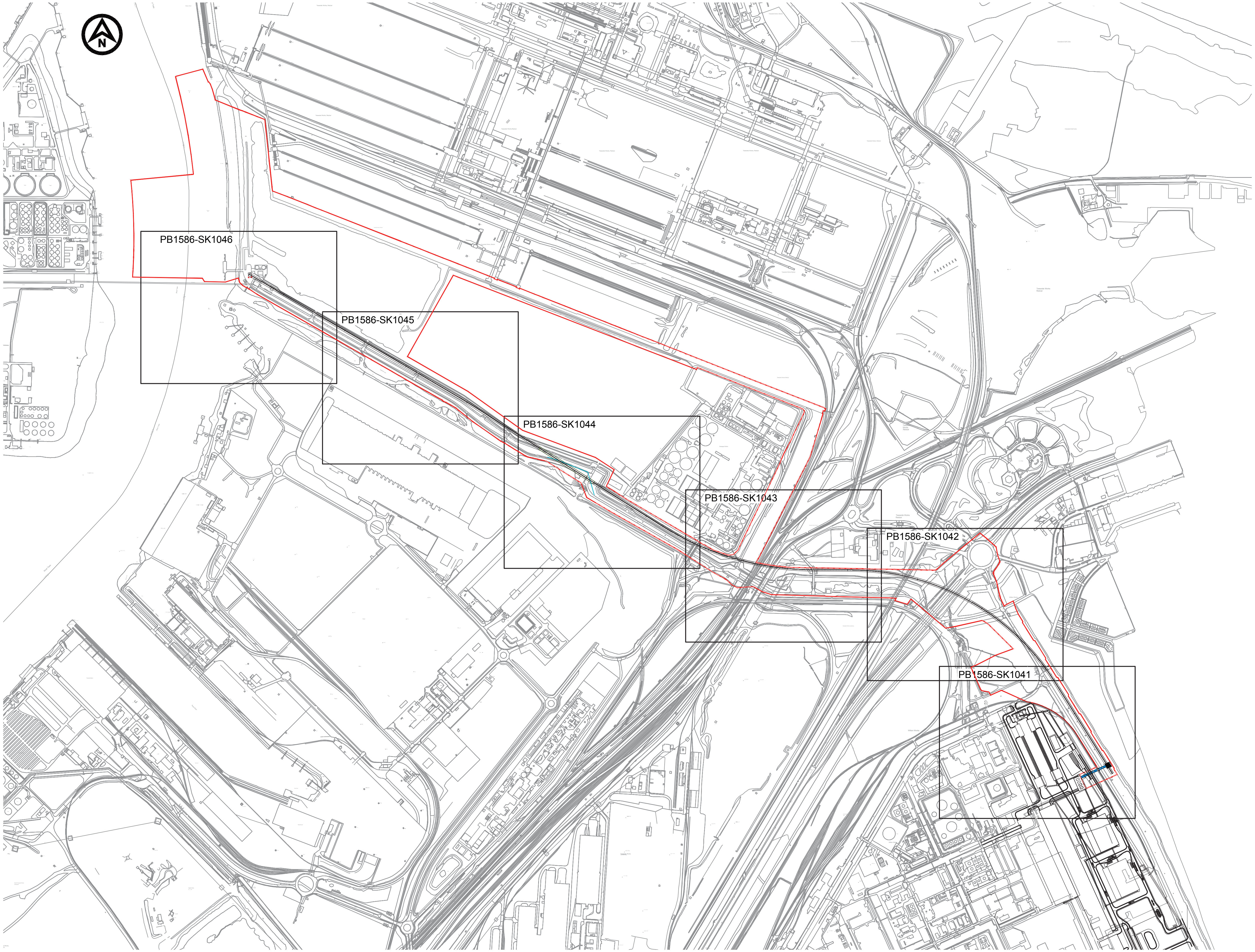
3.1.5 Within the area that would require dredging in the current approach channel, the channel would be deepened from 10.4m below CD (bCD) (-13.25mOD (Ordnance Datum)) to 14.1m bCD (-16.95mOD) (to match the depth of the remainder of the approach channel downstream of this point to the mouth of the Tees). The approach channel dredging required would be the same for both the open quay structure and solid quay structure. It is proposed that dredging to 16m bCD (-18.85mOD) would be undertaken to create the berth pocket.

---

[1] In the Environmental Scoping Report (Royal HaskoningDHV, 2013), three options for the location of the MHF were presented. Options 1 and 2 included locating the MHF at Redcar Bulk Terminal (RBT) and Sahaviriya Steel Industries (SSI) respectively. These options were subsequently discounted following further landowner negotiations, with the preferred option being to locate the MHF at Wilton (Option 3 in the Environmental Scoping Report).

3.1.6 **Table 3-1** sets out the parameters for each element of the Harbour facilities proposals. The EIA has been undertaken on the basis of these parameters.

DRG No. PB1586-SK1040



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SOUTHERN ROUTE - KEY PLAN
REGULATION 5(2)(o) DOCUMENT 3.3A

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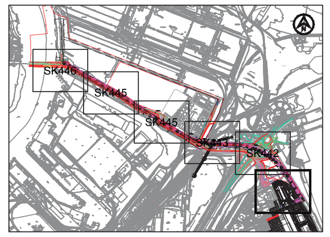
REVISION E

DRG No. PB1586-SK1041

NOTES

MAJOR CROSSINGS

MC 0 : Eastern Boundary Road	- Pass over in bridge
MC 1 : Highway A1085	- Pass over in bridge
MC 2 : YPL 1st access road	- Pass over in bridge
MC 3 : Hot metal rail	- Pass over in bridge
MC 4 : NWL 2nd access road	- Pass over in bridge
MC 5 : National power grid lines	- Pass under 10 m clearance
MC 6 : SSI road bridge	- Pass over in bridge
MC 7 : National rail way	- Pass over in bridge
MC 8 : Access NWL W.T.P.	- Pass over in bridge
MC 9 : Outfall	- Pass over in bridge



KEY PLAN

SCALE 1:50000

LEGEND - CONVEYOR

- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- TRANSFER TOWER
- ACCESS ROADS
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

- EASEMENT ZONES
- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
- FIBRE OPTIC CABLE
- MISC - DRAINS, CABLES, DUCTS
- FOUL WATER - SEMBCORP
- WATER - NWL
- GAS - ABANDONED
- ABOVEGROUND PIPELINE CORRIDOR
- OVERHEAD POWER CABLES
- CONVEYOR LIMITS OF DEVIATION

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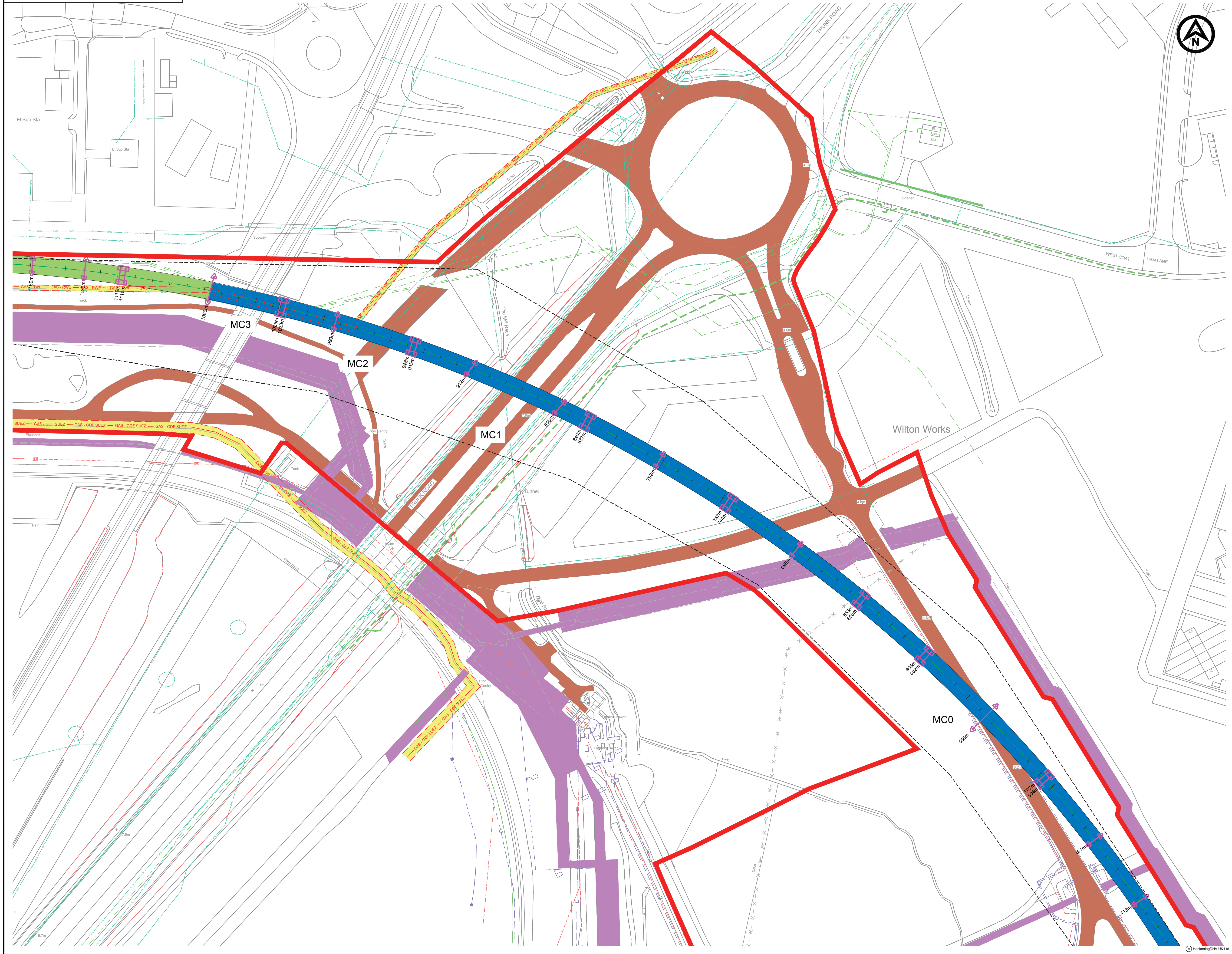
DRG No. PB1586-SK1042



NOTES

MAJOR CROSSINGS

MC 0 : Eastern Boundary Road	- Pass over in bridge
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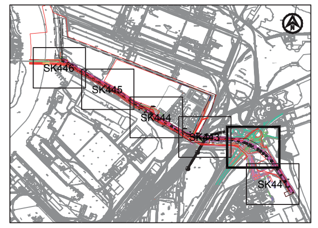
MC 2 : YPL 1st access road	- Pass over in bridge
MC 3 : Hot metal rail	- Pass over in bridge
MC 4 : NWL 2nd access road	- Pass over in bridge
MC 5 : National power grid lines	- Pass under 10 m clearance
MC 6 : SSI road bridge	- Pass over in bridge
MC 7 : National rail way	- Pass over in bridge
MC 8 : Access NWL W.T.P.	- Pass over in bridge
MC 9 : Outfall	- Pass over in bridge



KEY PLAN

SCALE 1:50000

LEGEND - CONVEYOR

- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- TRANSFER TOWER
- ACCESS ROADS
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

- EASEMENT ZONES
- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
- FIBRE OPTIC CABLE
- MISC - DRAINS, CABLES, DUCTS
- FOUL WATER - SEMBCORP
- WATER - NWL
- GAS - ABANDONED
- ABOVEGROUND PIPELINE CORRIDOR
- OVERHEAD POWER CABLES
- CONVEYOR LIMITS OF DEVIATION

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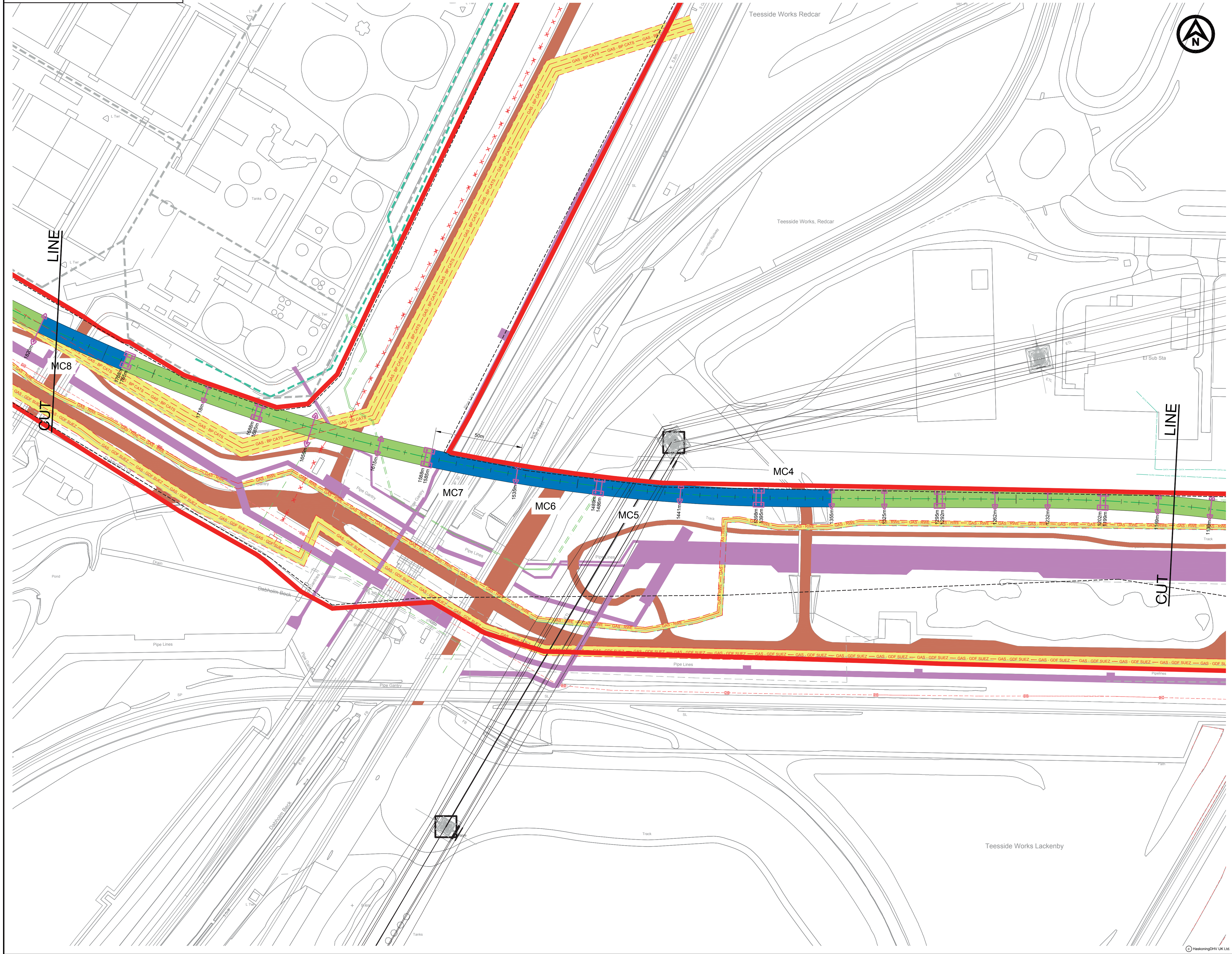

NOTES

MAJOR CROSSINGS

MC 0 : Eastern Boundary Road - Pass over in bridge
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MC 3 : Hot metal rail - Pass over in bridge
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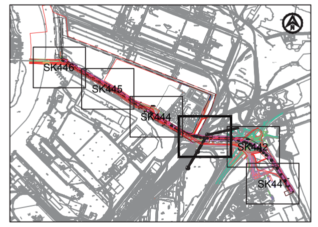
MC 7 : National rail way - Pass over in bridge
MC 8 : Access NWL W.T.P. - Pass over in bridge
MC 9 : Outfall - Pass over in bridge



KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

TYPE 3 - OPEN CONVEYOR - 2 LEGS
TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
TRANSFER TOWER
ACCESS ROADS
CONVEYOR FOOTINGS
CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

EASEMENT ZONES
GAS - BP CATS
GAS - GDF SUEZ
GAS - RWE
FIBRE OPTIC CABLE
MISC - DRAINS, CABLES, DUCTS
FOUL WATER - SEMBCORP
WATER - NWL
GAS - ABANDONED
ABOVEGROUND PIPELINE CORRIDOR
OVERHEAD POWER CABLES
CONVEYOR LIMITS OF DEVIATION

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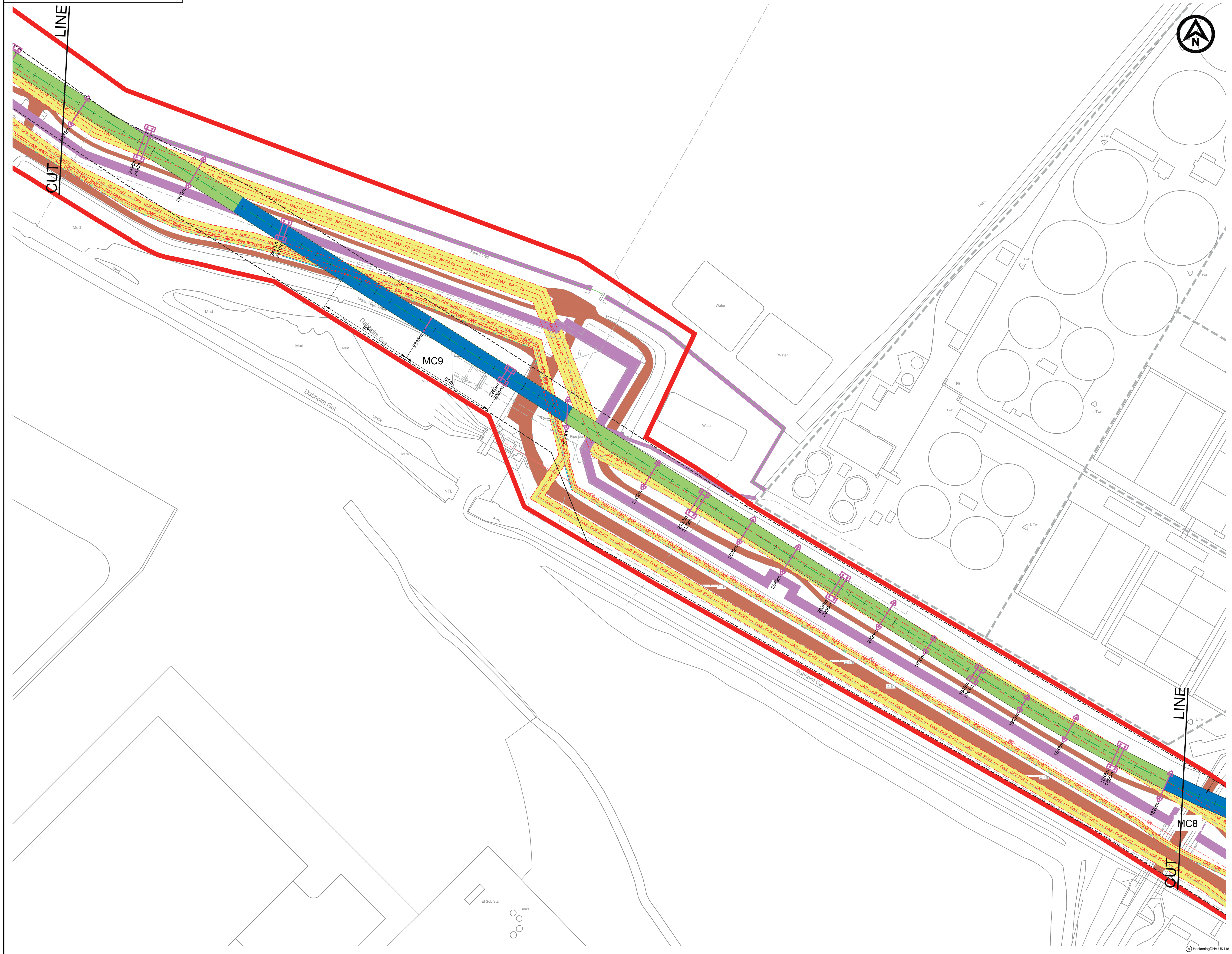

NOTES

MAJOR CROSSINGS

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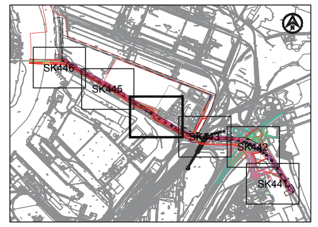

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- TRANSFER TOWER
- ACCESS ROADS
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

- EASEMENT ZONES
- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
- FIBRE OPTIC CABLE
- MISC - DRAINS, CABLES, DUCTS
- FOUL WATER - SEMBCORP
- WATER - NWL
- GAS - ABANDONED
- ABOVEGROUND PIPELINE CORRIDOR
- OVERHEAD POWER CABLES
- CONVEYOR LIMITS OF DEVIATION

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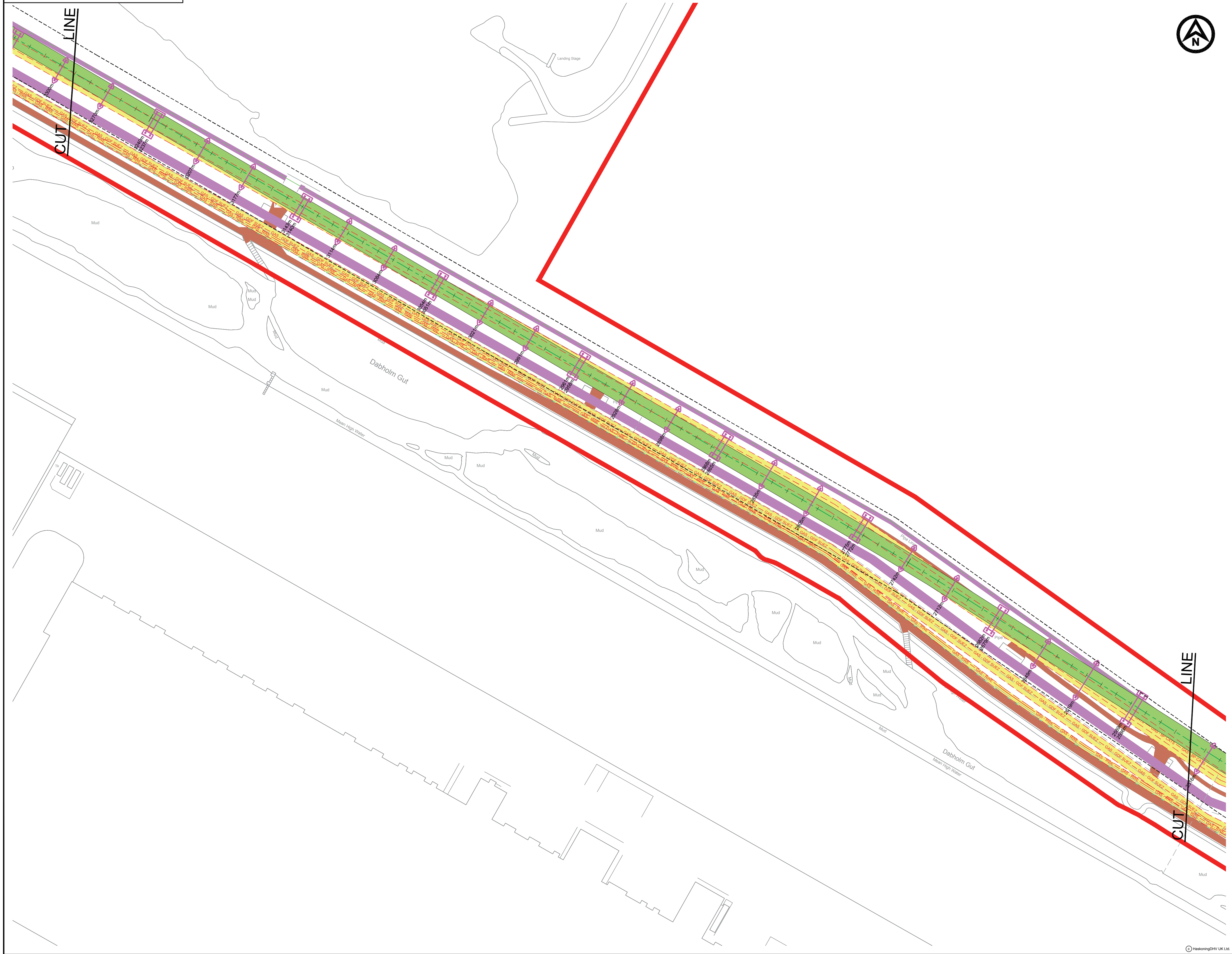

NOTES

MAJOR CROSSINGS

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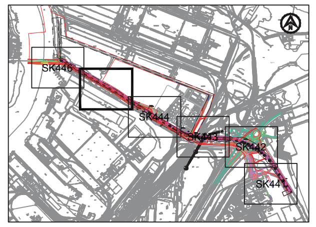
MC 7 : National rail way	- Pass over in bridge
MC 8 : Access NWL W.T.P.	- Pass over in bridge
MC 9 : Outfall	- Pass over in bridge



KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- TRANSFER TOWER
- ACCESS ROADS
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

- EASEMENT ZONES
- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
- FIBRE OPTIC CABLE
- MISC - DRAINS, CABLES, DUCTS
- FOUL WATER - SEMBCORP
- WATER - NWL
- GAS - ABANDONED
- ABOVEGROUND PIPELINE CORRIDOR
- OVERHEAD POWER CABLES
- CONVEYOR LIMITS OF DEVIATION

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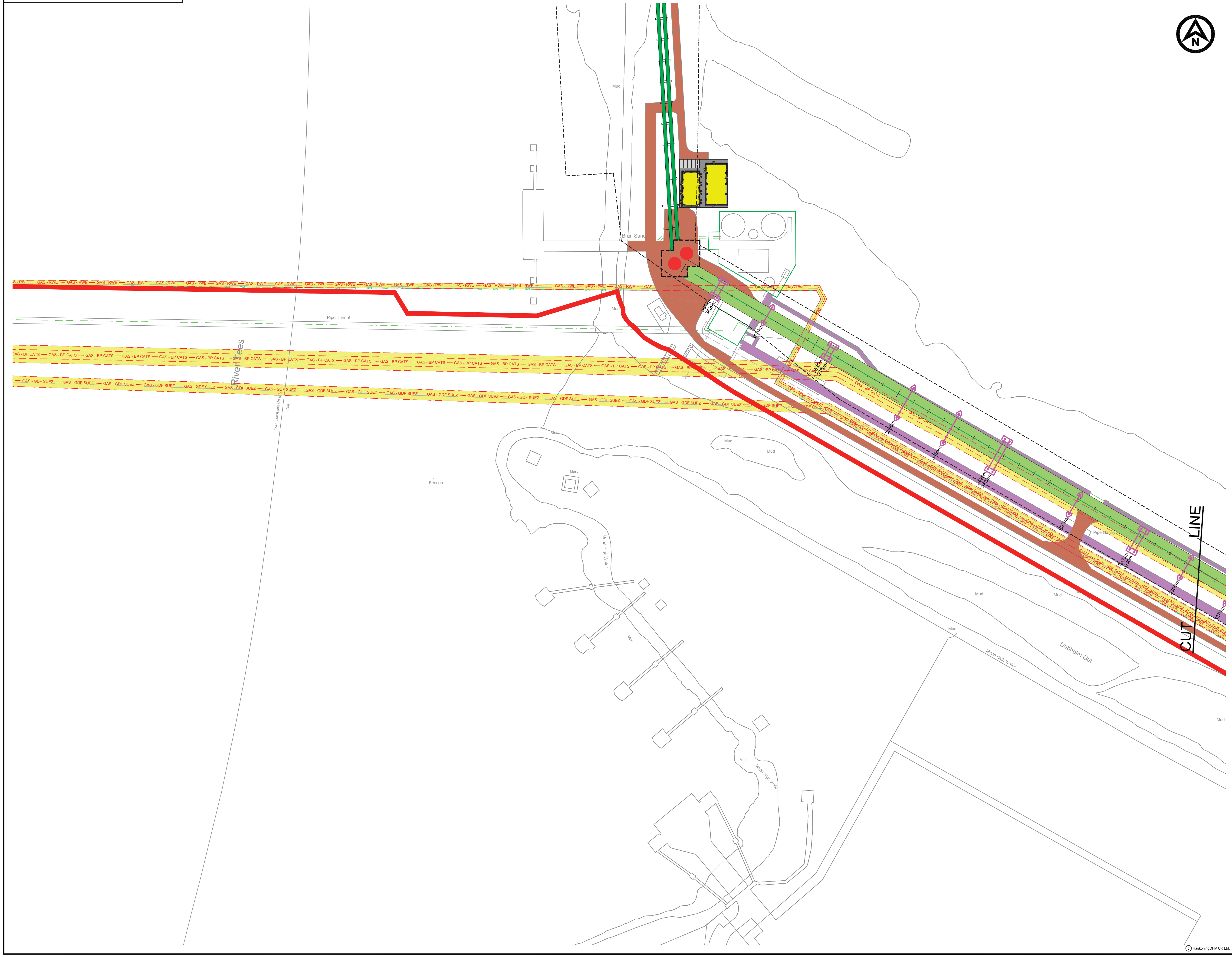

NOTES

MAJOR CROSSINGS

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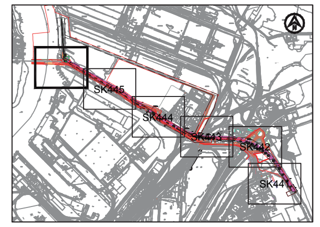
MC 5 : National power grid lines	- Pass under 10 m clearance
MC 6 : SSI road bridge	- Pass over in bridge
MC 7 : National rail way	- Pass over in bridge
MC 8 : Access NWL W.T.P.	- Pass over in bridge
MC 9 : Outfall	- Pass over in bridge



KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

TYPE 3 - OPEN CONVEYOR - 2 LEGS
TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
SURGE BINS
ACCESS ROADS
EXISTING BUILDING

LEGEND - EXISTING SERVICES

EASEMENT ZONES
GAS - BP CATS
GAS - GDF SUEZ
GAS - RWE
FIBRE OPTIC CABLE
MISC - DRAINS, CABLES, DUCTS
FOUL WATER - SEMBCORP
WATER - NWL
GAS - ABANDONED
ABOVEGROUND PIPELINE CORRIDOR
OVERHEAD POWER CABLES
CONVEYOR FOOTINGS
CONVEYOR AT THE QUAY
CONVEYOR LIMITS OF DEVIATION

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CONVEYOR ROUTE PLANS
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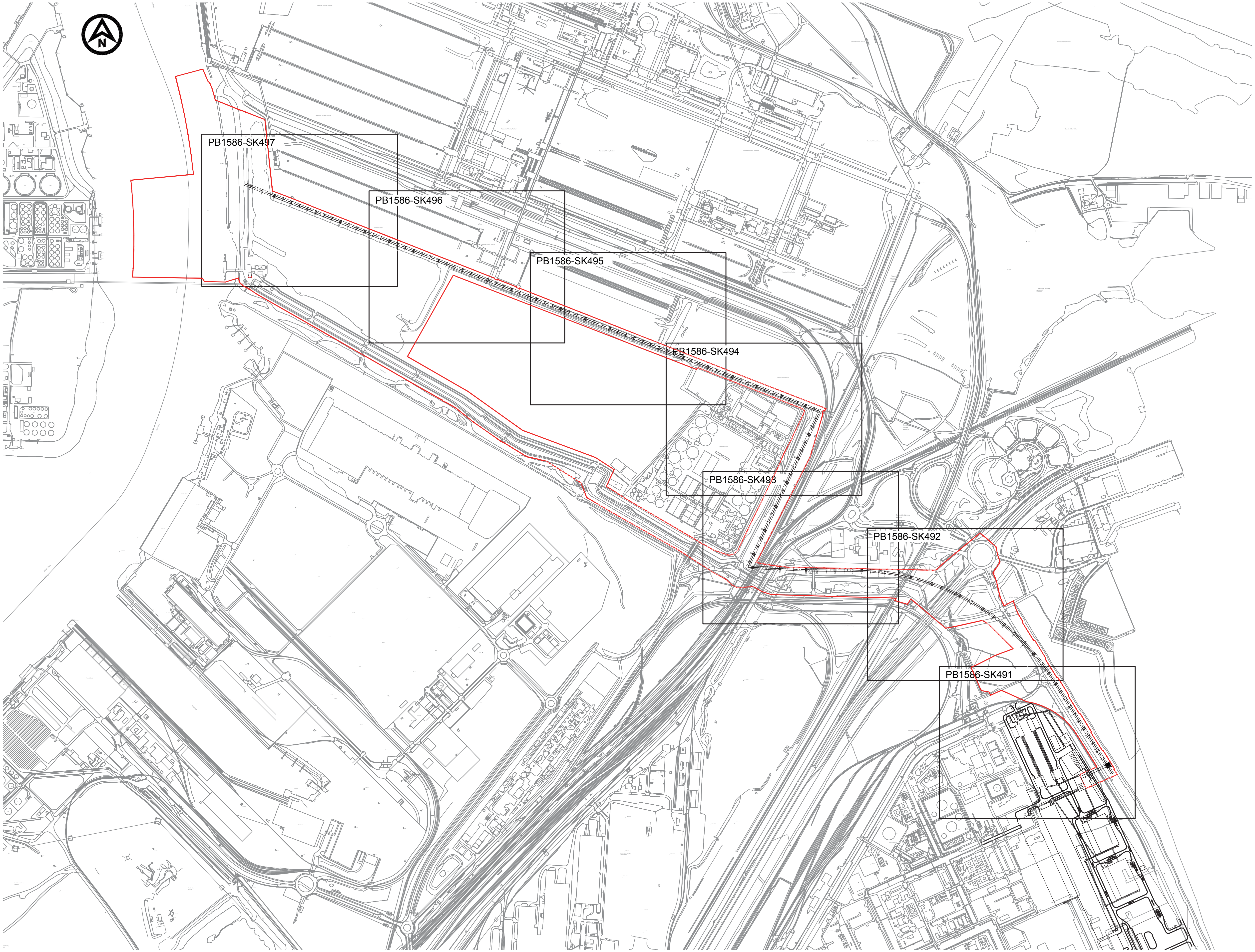

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DOCUMENT 3.3H

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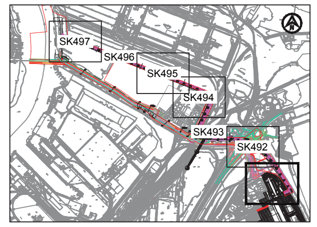
MC 8 : Access NWL W.T.P. - Pass over in bridge
MC 9 : Outfall - Pass over in bridge



KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- TRANSFER TOWER
- ACCESS ROUTES
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

- EASEMENT ZONES
- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
- FIBRE OPTIC CABLE
- MISC - DRAINS, CABLES, DUCTS
- FOUL WATER - SEMBCORP
- WATER - NWL
- GAS - ABANDONED
- ABOVEGROUND PIPELINE CORRIDOR
- OVERHEAD POWER CABLES
- CONVEYOR LATERAL LIMITS OF DEVIATION

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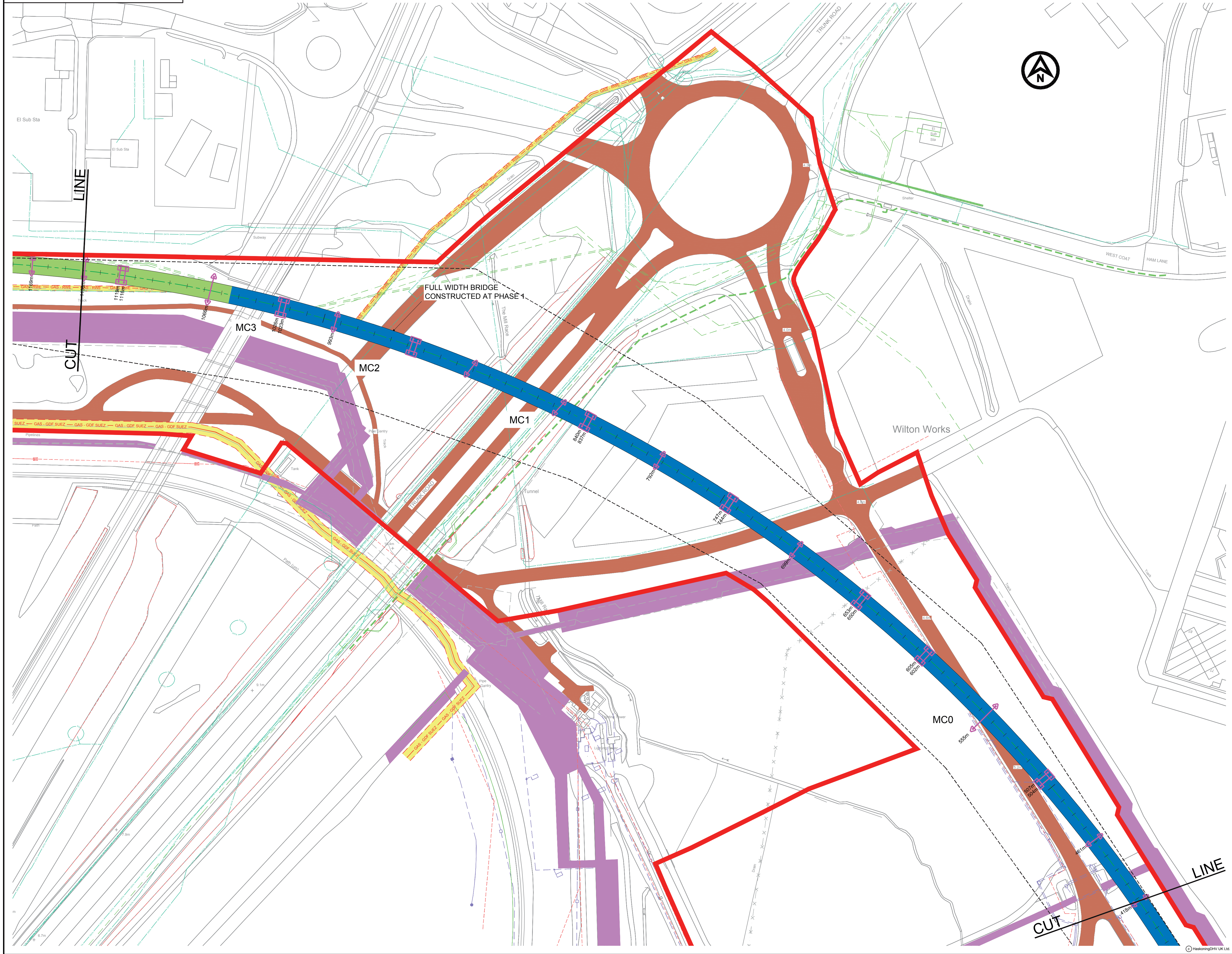

NOTES

MAJOR CROSSINGS

MC 0 : Eastern Boundary Road - Pass over in bridge
MC 1 : Highway A1085 - Pass over in bridge
MC 2 : YPL 1st access road - Pass over in bridge
MC 3 : Hot metal rail - Pass over in bridge
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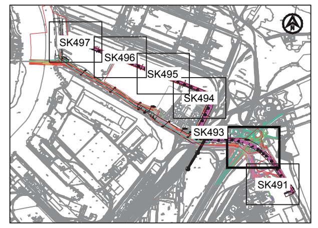

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

TYPE 3 - OPEN CONVEYOR - 2 LEGS
TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
TRANSFER TOWER
ACCESS ROUTES
CONVEYOR FOOTINGS
CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

EASEMENT ZONES
GAS - BP CATS
GAS - GDF SUEZ
GAS - RWE
FIBRE OPTIC CABLE
MISC - DRAINS, CABLES, DUCTS
FOUL WATER - SEMBCORP
WATER - NWL
GAS - ABANDONED
ABOVEGROUND PIPELINE CORRIDOR
OVERHEAD POWER CABLES
CONVEYOR LATERAL LIMITS OF DEVIATION

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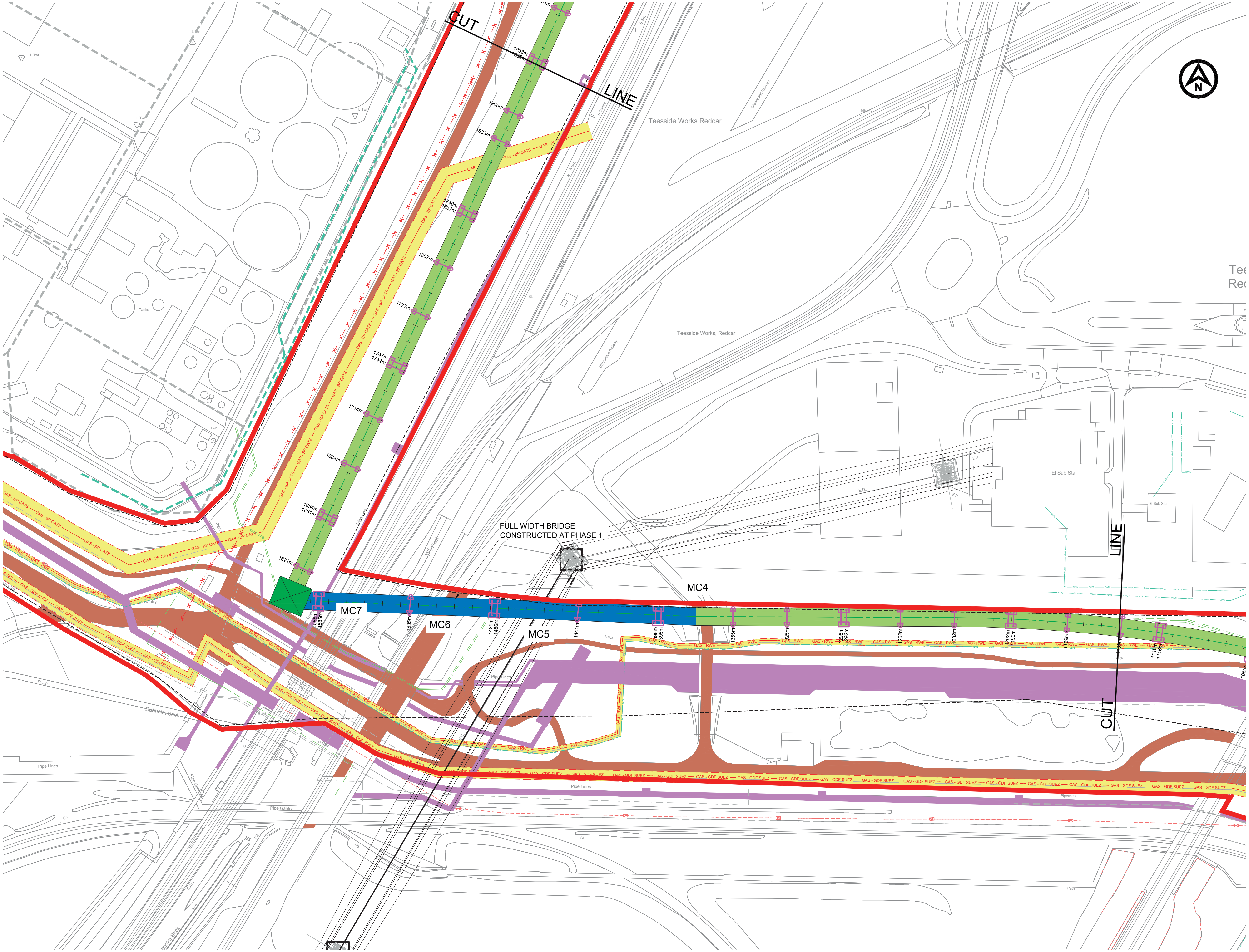

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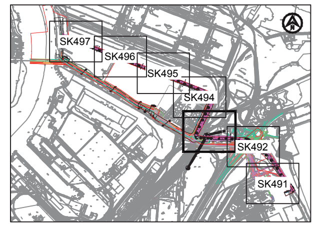

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

TYPE 3 - OPEN CONVEYOR - 2 LEGS
TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
TRANSFER TOWER
ACCESS ROUTES
CONVEYOR FOOTINGS
CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

EASEMENT ZONES
GAS - BP CATS
GAS - GDF SUEZ
GAS - RWE
FIBRE OPTIC CABLE
MISC - DRAINS, CABLES, DUCTS
FOUL WATER - SEMBCORP
WATER - NWL
GAS - ABANDONED
ABOVEGROUND PIPELINE CORRIDOR
OVERHEAD POWER CABLES
CONVEYOR LATERAL LIMITS OF DEVIATION

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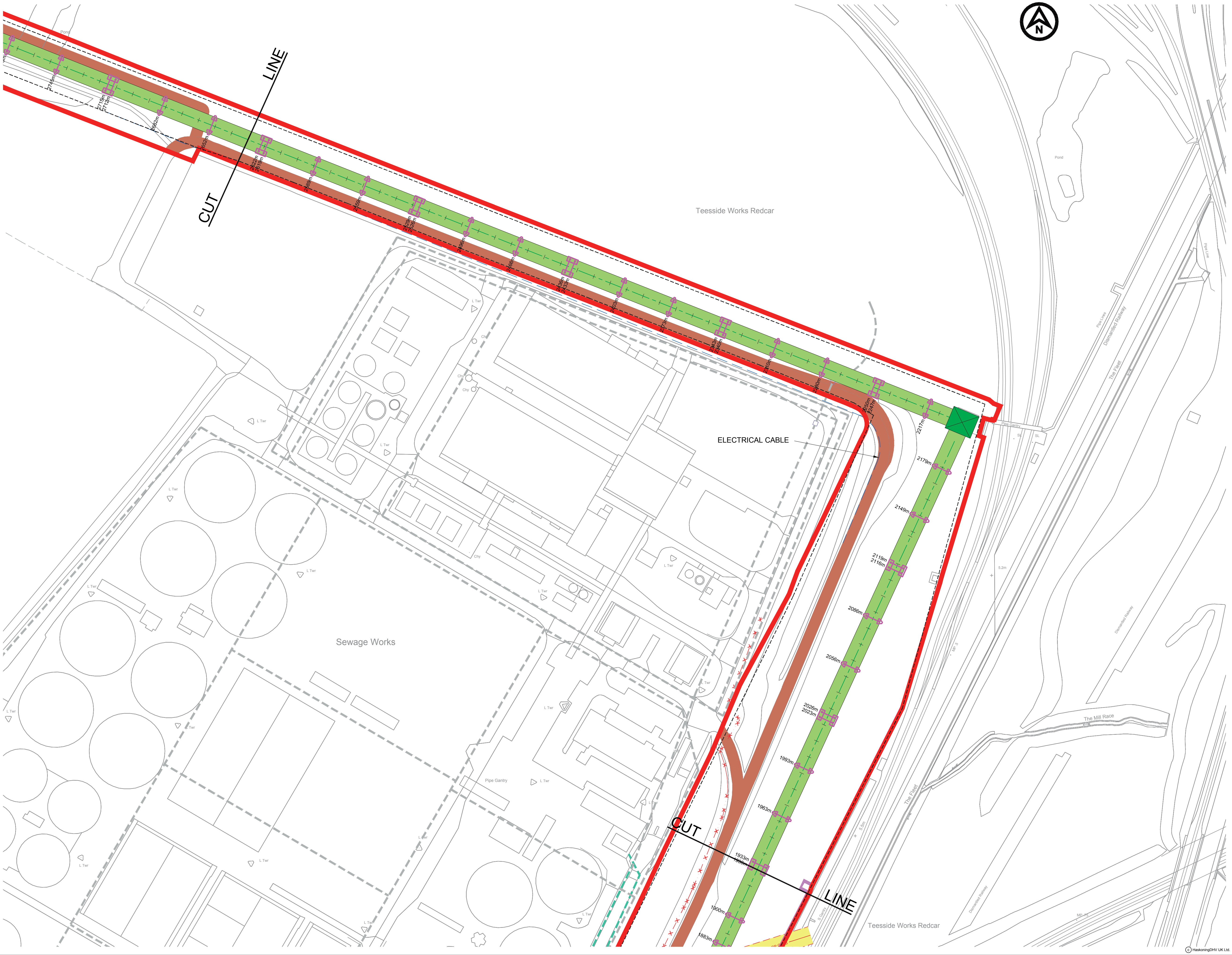

NOTES

1. FOR QUAY PLAN DETAILS REFER TO DRAWINGS NO. PB1586-SK91, SK93, SK122 & SK123.

MAJOR CROSSINGS

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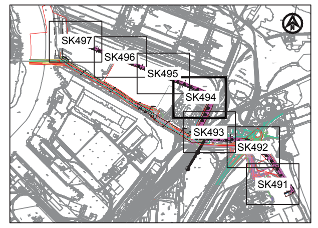

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- TRANSFER TOWER
- ACCESS ROUTES
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

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- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
- FIBRE OPTIC CABLE
- MISC - DRAINS, CABLES, DUCTS
- FOUL WATER - SEMBCORP
- WATER - NWL
- GAS - ABANDONED
- ABOVEGROUND PIPELINE CORRIDOR
- OVERHEAD POWER CABLES
- CONVEYOR LATERAL LIMITS OF DEVIATION
- ELECTRICAL CABLE

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DRG No. PB1586-SK495

NOTES

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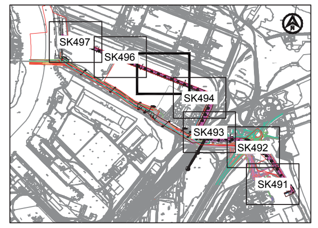

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

TYPE 3 - OPEN CONVEYOR - 2 LEGS
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TRANSFER TOWER
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CONVEYOR AT THE QUAY

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WATER - NWL
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ABOVEGROUND PIPELINE CORRIDOR
OVERHEAD POWER CABLES
CONVEYOR LATERAL LIMITS OF DEVIATION

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DRG No. PB1586-SK496

NOTES

MAJOR CROSSINGS

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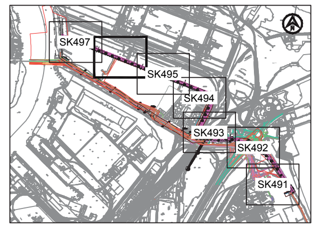

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

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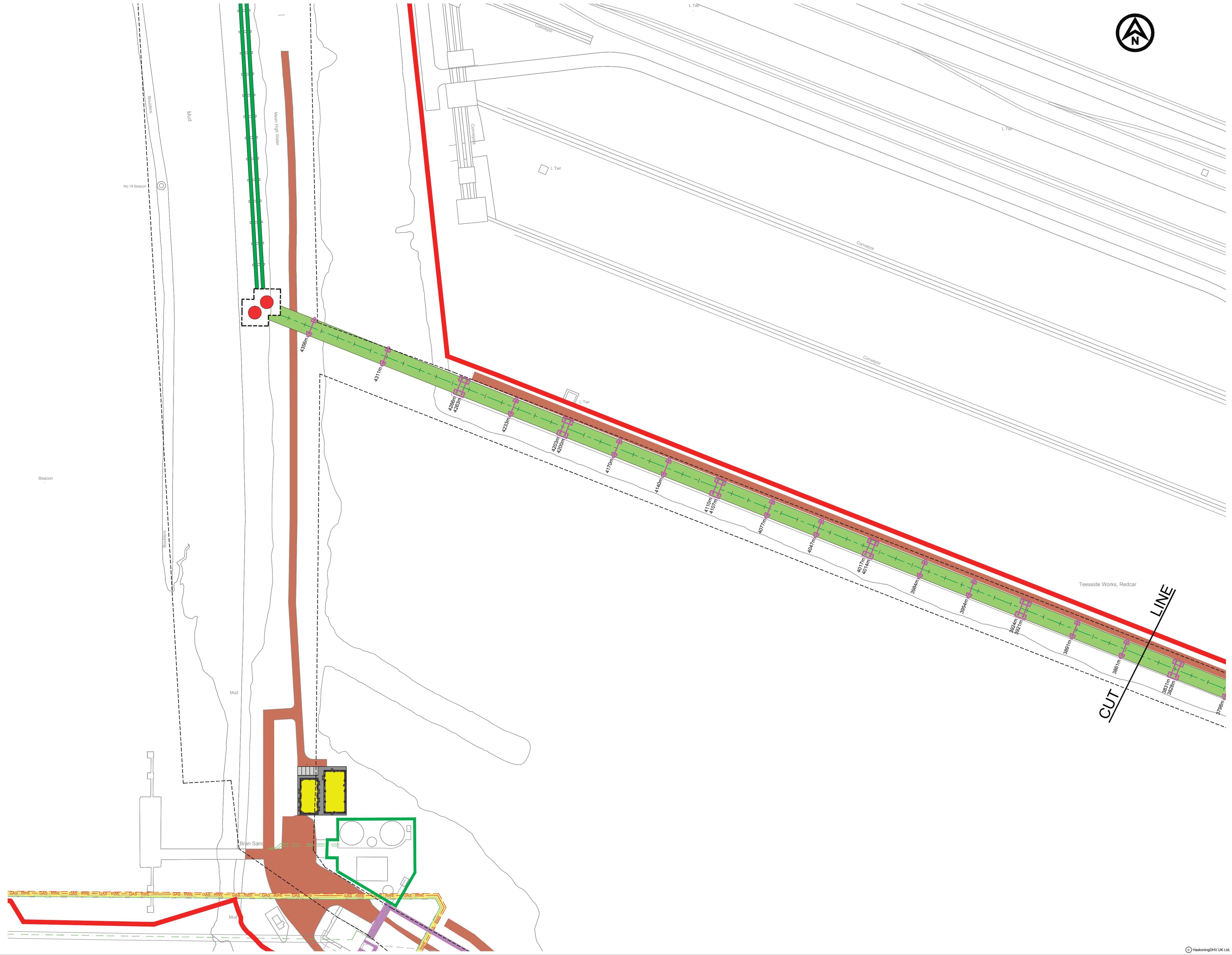

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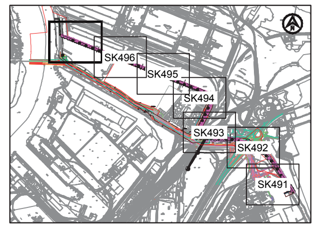

KEY PLAN
SCALE 1:50000

LEGEND - CONVEYOR

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- TRANSFER TOWER
- ACCESS ROUTES
- CONVEYOR FOOTINGS
- CONVEYOR AT THE QUAY

LEGEND - EXISTING SERVICES

- EASEMENT ZONES
- GAS - BP CATS
- GAS - GDF SUEZ
- GAS - RWE
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- MISC - DRAINS, CABLES, DUCTS
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- WATER - NWL
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Table 3-1 Parameters of Works used as the basis for assessment in the EIA

Works No	Works Description (Summary)	Items	Parameters
1	Dredging Area	Dredging Area Demolition of NWL Facility Re-grading of slope Revetments Berth Pocket	**Dredging** Maximum depth of approach channel dredging: -16.95m OD Maximum depth of berth pocket dredging: -18.85m OD **Berth Pocket** Maximum length: 490m Maximum width: 51m
2	Quay Area	Quay Approach Bridges (Open structure only): Ship Loaders and rails Surge Bins and Transfer Towers	**Open Quay Option:** Quay structure dimensions: 486m long x 28m wide Quayside (Engineering Fill) Dimensions: 43m to 53m **Solid Quay Option:** Quay Structure Dimensions: 486m long x 28m wide Quayside (Engineering Fill) Dimensions: 65m to 87m **Ship Loaders** Number: Maximum Number: 2 Maximum Height: 60mOD (with boom raised) **Surge Bins and Transfer Towers Southern Conveyor Route:** In location shown on Document 3.8B (Solid quay) or Document 3.9B (Open quay) **Surge Bins and Transfer Towers Northern Conveyor Route:**

			In location shown on Document 3.8A (Solid quay) or Document 3.9A (Open quay) **Surge Bins** Maximum height: 35m Maximum diameter 7.5m **Transfer Towers:** Maximum Height: 30m Maximum section: 7.5m x 7.5m square
3	Lagoon	Lagoon Enhancement Works Conveyor supports (Northern route only)	As shown on Plan PB1586-SK467 in MMS (Appendix 3.1 to HRA (Document 6.3)) Maximum of 1 in Lagoon as shown on Document Series 3.3
4	Conveyor Works (Elevated)	Conveyor (Conveyor supports and transfer towers referred to in other Works)	**Lateral limits of deviation** as shown on Documents 2.2A to 2.2F **Vertical limits of deviation** as shown on Documents 3.11A (Southern Route) and 3.11B (Northern Route) **Maximum depth** of conveyor body: 6m **Type of conveyor** as shown on Documents 3.3A to 3.3F (Southern Route) and Document 3.3I to 3.3O (Northern Route)
5	Ground Level corridors	Conveyor footings Access to quay	**Access, maintenance and construction routes**: As on AROW Plans (Documents 2.3A to 2.3C) and Layout Plans (Ground Level) (Documents 3.2B to 3.2F (Northern Route) or Documents 3.2H to 3.2L (Southern

		Access for construction and maintenance Support structures for conveyor Transfer towers Temporary acoustic fencing Security control (to the north east of Temporary Compound Site E) Security fencing around Tank Farm (adjacent Site C)	Route) **Transfer Towers:** In locations shown on Document 3.3 series Maximum height: 30m **Support Structures:** Maximum height: 30m **Acoustic fencing:** Hoarding maximum 3m height Location as shown on Plan 9 YO989-HF-9-003 Figure 9.3, Section 9 of Environmental Statement (Document 6.4) **Security Fencing around Tank Farm:** Max 2m high
6A	Temporary Compound Site A	Portacabin (offices) Parking Material storage, preparation and plant area Stores (Containers) Fencing	**Layout as on Document 3.4C** Maximum floorplate of Portacabin Offices:125m^2 Maximum height of Portacabin offices: 6m Maximum Car Park Spaces: 13 Maximum extent of material storage, preparation and plant area: 3,200m^2 Maximum height of stores (Containers): 3m Security fencing and gating maximum 2m height
6B	Permanent Use Site A	Substation	**Layout as on Document 3.5A**

		Car Parking	Substation Elevation as on Document 3.6B Maximum Size Substation: 200 m^2 Maximum height of substation: 5.75m: Maximum Car Parking Spaces:2
7	Temporary Compound Site B	Portacabin (offices) Parking Material storage, preparation and plant area Stores (Containers) Fencing	**Layout as on Document 3.4D** Maximum floorplate of Portacabin Offices: 125m^2 Maximum height of Portacabin offices: 6m Maximum Car Park Spaces: 10 Maximum extent of material storage, preparation and plant area: 4,650m^2 Maximum height of stores (Containers): 3m Security fencing and gating max 2m height
8	Temporary Compound Site D	Portacabin (offices) Parking Material storage, preparation and plant area Stores (Containers) Fencing	**Layout as on Document 3.4E** Maximum floorplate of Portacabin Offices: 125m^2 Maximum height of Portacabin offices: 6m Maximum Car Park Spaces: 25 Maximum extent of material storage, preparation and plant area: 11,100m^2 Maximum height of stores (Containers): 3m Security fencing and gating max 2m height
9	Permanent Administration Area Site C	General Services Building Substation	**Layout as shown on Document 3.6B** Building Elevations and specifications as on Document 3.6A

		Car Parking Underground waste storage tank	Maximum height of building: 4.4 m Maximum size of building: 288 m^2 Maximum size Substation: 200 m^2 Maximum height of substation: 5.75m: Maximum Car Park Spaces: 5
10	Temporary Compound Site E	Portacabin (offices) Parking Material storage, preparation and plant area Stores (Containers) Fencing	**Layout as on Document 3.4F** Maximum floorplate of Portacabin Offices: 125m^2 Maximum height of Portacabin offices: 6m Maximum Car Park Spaces: 20 Maximum extent of material storage, preparation and plant area: 3,800m^2 Maximum height of stores (Containers): 3m Security fencing and gating max 2m height
11	Temporary Compound Site F	Portacabin (offices) Parking Material storage, preparation and plant area Stores (Containers) Fencing	**Layout as on Document 3.4H** Maximum Floorplate of Portacabin Offices: 250m^2 Maximum height of Portacabin offices: 6m Maximum Car Park Spaces: 44 Maximum extent of material storage, preparation and plant area: 12,400m^2 Maximum height of stores (Containers): 3m Security fencing and gating max 2m height

12	Traffic island temporary works		**General arrangement** as shown on Document 3.14

Key parameters of the proposed quay

Quay length

3.1.7 As the design basis for the port terminal, the maximum design vessels proposed are 85,000DWT[2] with an overall length of 244m. The port terminal needs to be capable of accommodating the maximum design vessel at either berth although the constraints of the site mean that it will not be possible to accommodate two maximum design vessels at the same time (however one maximum design vessel and a smaller design vessel could be accommodated at the same time, given the proposal to create two berths).

3.1.8 The maximum quay length that could be developed along the Bran Sands frontage is 486m and, therefore, this length has been used as the basis for assessment.

Quay width

3.1.9 The quay width of 28m is determined by the geometry of the equipment to be accommodated on the deck. The main items of equipment are the ship loader, with a rail gauge of about 12m and the linked conveyor feed system.

Quayside

3.1.10 The quayside will consist of engineering fill to create a trafficable surface adjacent to the quay, for the full length of the quay. The width of the quayside will be 43m – 53m for the open quay option, and 65m – 87m for the solid quay option.

Quay level

3.1.11 The level of the quay is set such that significant flooding or overtopping of the deck is not experienced during the design life of the facility.

3.1.12 The maximum design water level based on the Highest Astronomical Tide (HAT) and anticipated sea level rise over the design life of the facility is +6.46m Chart Datum (CD) (+3.61mOD). Typically a deck level at least 2m above the high water level is sufficient for river berths where relatively low wave heights are experienced. Therefore, the estimated deck level of the structure is +8.45mCD (+5.60mOD).

Quay positioning

3.1.13 The concept design of the quay recognised that the positioning of the berth is constrained by the site boundary to the north and the river frontage line to the west. Phase 2 of the proposed scheme would ultimately involve the demolition of the Northumbria Water Ltd (NWL) Jetty (refer to **Figure 1-3**) and dolphins, as these structures would be within the footprint of the fully developed Phase 2 berth.

---

[2] Deadweight tonnage

Operations at the NWL Sludge Jetty ceased in 2009 when NWL changed from liquid sludge imports to dry imports.

3.1.14 Typically, the quay would be positioned as far out into the river as possible to take advantage of the deeper water near to the river channel in order to reduce dredging requirements or, in the case of the solid quay structure (see below), to balance the dredge and reclamation quantities.

3.1.15 In this case, the constraint relating to how far into the river the quay may be located is the river frontage line, which is defined by PD Ports. The berth should also be orientated so that the predominant wind, wave and current have the least effects on the vessels, reducing mooring loads on the structure. In the river this typically means aligning the berth axis with the direction of water flow.

3.1.16 Given the above, the proposed quay line at this position in the river would be orientated approximately parallel to the river (**Drawing PB1586-SK93** and **Drawing PB1586-SK91**).

DRG No. PB1586-SK93

NOTES

1. THIS DRAWING IS ONLY INTENDED TO BE ILLUSTRATIVE OF A POTENTIAL LAYOUT OF A SOLID QUAY CONSTRUCTION. FINAL LENGTHS AND POSITIONS OF THE VARIOUS ELEMENTS MAY BE SUBJECT TO CHANGE.
2. FOR SECTION REFER TO DRAWING NO. PB1586-SK94. SECTION SHOWS DETAIL INTERSECTING LINE OF SECTION ONLY.

LEGEND

- ORDER LIMITS
- QUAYSIDE (ENGINEERING FILL)
- DREDGED AREA
- DREDGED SIDE SLOPES
- EXTENT OF BERTH POCKET
- TRANSFER TOWER
- SURGE BINS
- CONVEYORS AT THE QUAY
- QUAY STRUCTURE
- SECTION MARKER
- ROADS
- ADMINISTRATIVE AREAS ETC.
- TYPE 3 - OPEN CONVEYOR - 2 LEGS
- TYPE 4 - OVAL ENCLOSED CONVEYOR - 2 LEGS
- HARDSTAND AREA
- WALKWAYS
- CONVEYOR FOUNDATION LOCATIONS INDICATIVE ONLY
- EXISTING BUILDING
- CROWN ESTATES LANDOWNERSHIP BOUNDARY

REV	DATE	DESCRIPTION	BY	CHK	APP
12	19/03/15	PLANNING ISSUE	LW	DGB	RWP
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10	11/03/15	PLANNING ISSUE	CH	SRS	RWP
9	09/03/15	PLANNING ISSUE	CH	SRS	RWP
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3	9/12/14	PLANNING ISSUE	TF		
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REVISIONS

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PROJECT

YORK POTASH

TITLE

THE YORK POTASH HARBOUR FACILITIES ORDER 201X INDICATIVE LAYOUT - OPEN QUAY NORTHERN ROUTE REGULATION 5 (2) (o) DOCUMENT 3.9A

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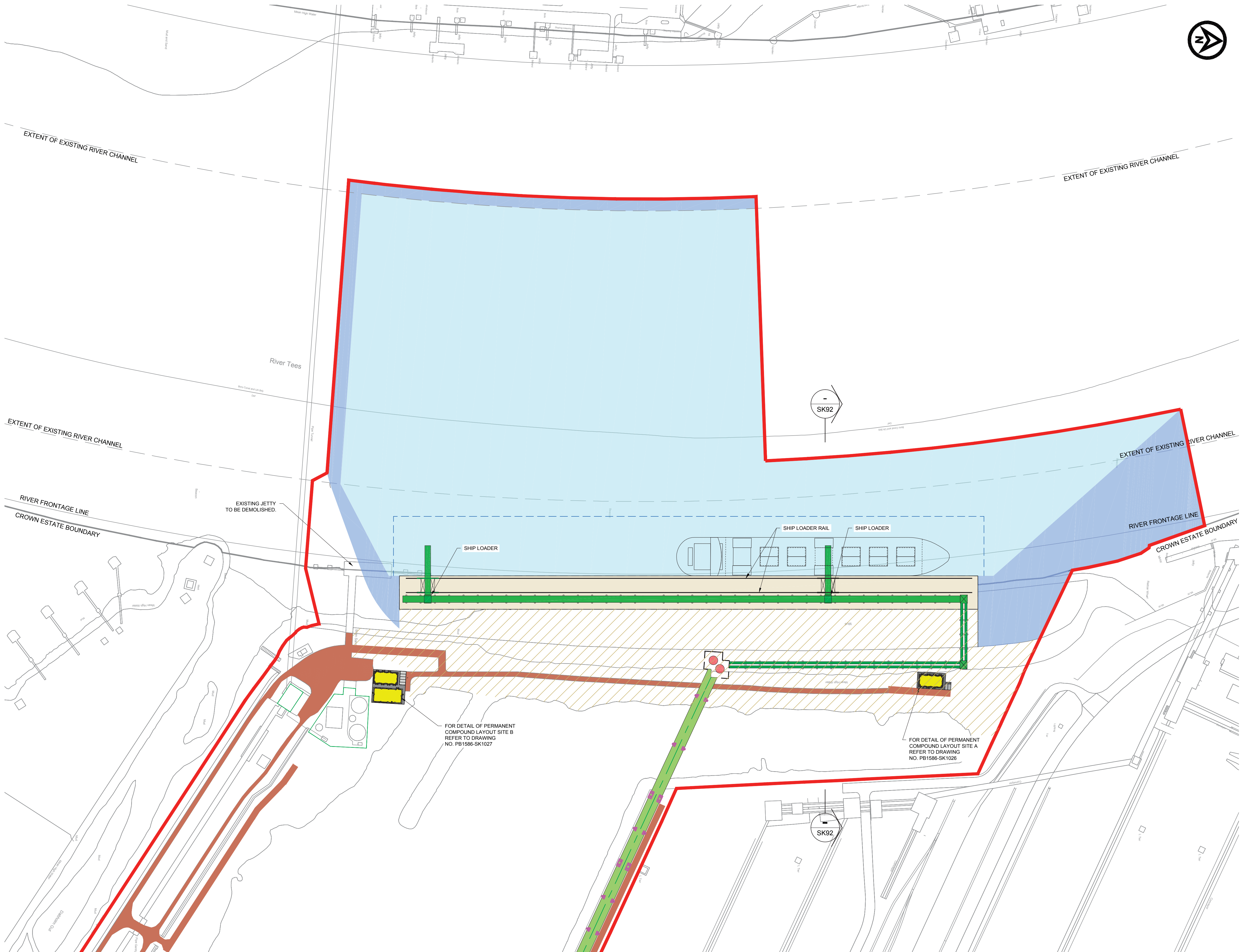
DRAWING No. PB1586-SK93

REVISION 12

DRG No. PB1586-SK91



NOTES

1. THIS DRAWING IS ONLY INTENDED TO BE ILLUSTRATIVE OF A POTENTIAL LAYOUT OF A SOLID QUAY CONSTRUCTION. FINAL LENGTHS AND POSITIONS OF THE VARIOUS ELEMENTS MAY BE SUBJECT TO CHANGE.
2. FOR SECTION REFER TO DRAWING NO. PB1586-SK92. SECTION SHOWS DETAIL INTERSECTING LINE OF SECTION ONLY.

LEGEND

- ORDER LIMITS
- QUAYSIDE (ENGINEERING FILL)
- DREDGED AREA
- DREDGED SIDE SLOPES
- EXTENT OF BERTH POCKET
- TRANSFER TOWER
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TITLE

THE YORK POTASH
HARBOUR FACILITIES ORDER 201X
INDICATIVE LAYOUT - SOLID QUAY
CONSTRUCTION - NORTHERN ROUTE
REGULATION 5(2)(o) DOCUMENT 3.8A

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REVISION 12

Form of construction of the port terminal

Open quay structure

3.1.17 Under this option, the quay and access bridge structures would be comprised of a reinforced concrete deck supported by approximately 200 driven steel tubular piles in Phase 1, with an additional 200 piles required for Phase 2. It is anticipated that the piles would be in the order of 0.9m diameter. The piles would support the concrete deck structures onto which the ship loader rails and supports for the conveyor would be fixed.

3.1.18 The open quay structure dimension would be 486m long by 28m wide (280m long in Phase 1). Access to the quay would be via approach bridge platform structures. Two of these access bridges would be constructed during Phase 1, allowing one to be used for the construction of Phase 2 whilst maintaining the other for operational access.

3.1.19 **Drawings PB1586-SK93** and **PB1586-SK94** (included below) show a plan and cross section of the open quay structure respectively.

3.1.20 The storage capacity estimated to be required at the port is approximately 2,000 tonnes total. It is proposed that one surge bin would be required for each conveyor and that these would each be 7.5m in diameter and approximately 35m high, each with a 1000 tonne capacity.. The conveyor system would need to be elevated to allow the product to be discharged into the top of the surge bins; the proposed elevations of the conveyor bridges are discussed further below. The foundation of the surge bins is proposed to be a reinforced concrete slab approximately 15m x 15m supported by piles.

3.1.21 It is proposed that the hydraulic connectivity between Bran Sands lagoon and the Tees estuary (which is currently achieved via a pipe running through the embankment) would be maintained. However, modifications to the existing situation are proposed as part of the measures that would be implemented to enhance habitats for waterbirds within Bran Sands lagoon. These measures are described below and, with regard to the connectivity between the estuary and lagoon, would include a mechanism that allows isolation of the lagoon from the estuary in the event of a pollution incident.

Solid quay structure

3.1.22 Under this option, the quay structure would be a combi-pile wall comprised of a line of steel tubular king piles linked by pairs of steel sheet piles. The king piles would connect via tie rods to a steel sheet pile anchor wall approximately 30 to 40m behind the berth line. The king piles would support a reinforced concrete cope beam onto which the waterside ship loader rails would be fixed. A piled beam would be required parallel to the cope beam to support the landside ship loader rails. The remaining area would be covered by a ground bearing concrete slab that would form the foundation for the conveying system.

3.1.23 For Phase 1, it is anticipated that the main wall would consist of 120 king piles (of approximately 2m diameter) with intermediate sheet piles. The anchor wall would be approximately 210m long and consist of sheet piles. It is estimated that in the order of 40, 660mm diameter piles would be required for the rail beam to support the landside ship loader rails, installed between the tie rods that connect the king piles to the anchor wall.

3.1.24 For Phase 2, it is anticipated that the main wall would consist of an additional 90 king piles with intermediate sheet piles and the anchor wall would consist of sheet piles of approximately 200m in length. A further 35 piles of 660mm diameter would be required for the rail beam to support the landside ship loader rails.

3.1.25 The factors which would drive the decision making process regarding the progression of an open or solid quay structure include additional consideration of geotechnical and geo-environmental data (once further ground investigations have been completed), operational preference and contractors' available plant and materials.

3.1.26 The sizing of the surge bin storage facilities would be the same as described above for the open quay structure. **Drawings PB1586-SK91** and **PB1586-SK92** above show a plan and cross section of the solid quay structure respectively.

3.1.27 Hydraulic connectivity between Bran Sands lagoon and the Tees estuary would be maintained by retaining a pipe connection through the embankment.

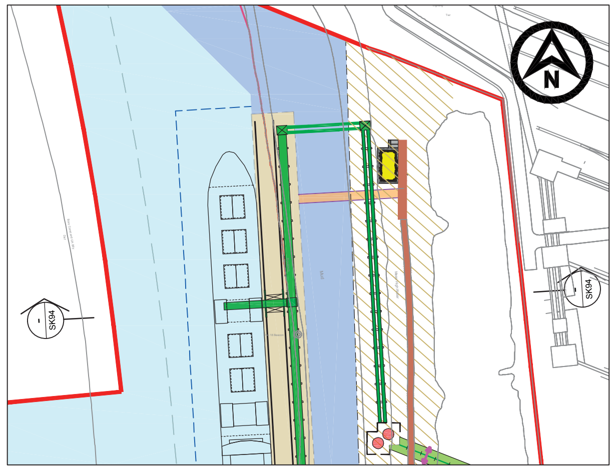
Dredging of the approach channel and berth pocket

Proposed dredge depth and volume (Phases 1 and 2)

3.1.28 Capital dredging of the berth pocket (and approaches to the pocket) would be required in order to allow the maximum design vessels proposed access to the port terminal. This dredging would be undertaken in two phases and is linked to the phased construction of the quay. Dredging would also be required to create the stable slope beneath the quay for the open suspended deck option.

3.1.29 As part of the dredging for both Phase 1 and Phase 2, capital dredging would be required within the approach channel in order to provide the required access for vessels. The required extent of dredging is shown in **Drawing PB1586–SK91** and **Drawing PB1586–SK93** for both quay options.

DRG No. PB1586-SK94



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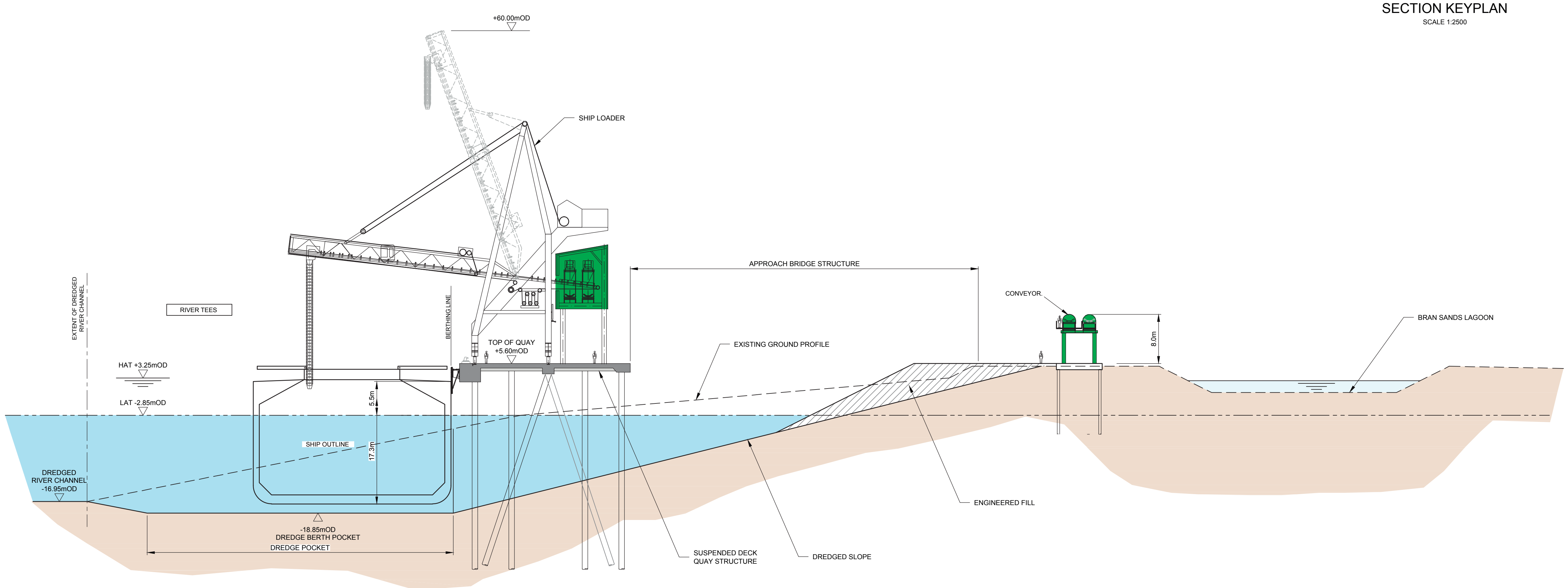

CROSS SECTION OF OPEN QUAY
(SEE SK93)

NOTES

1. THIS IS A CROSS SECTION WHICH DOESN'T SHOW FULL VISUAL BACKGROUND.

LEGEND

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CONVEYORS

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THE YORK POTASH
HARBOUR FACILITIES ORDER 201X
INDICATIVE SECTION
OPEN QUAY CONSTRUCTION
REGULATION 5 (2)(o)
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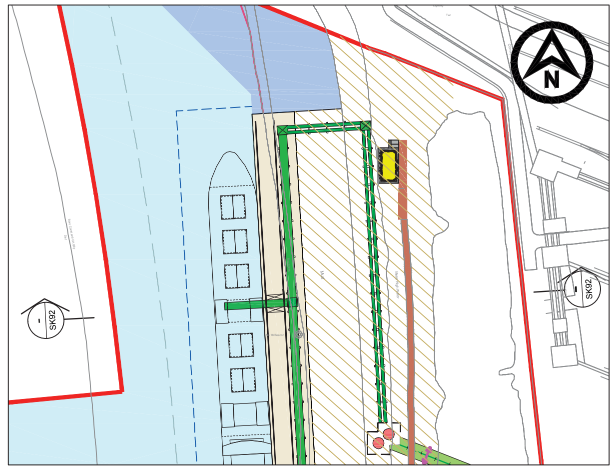
DRAWING No. PB1586-SK94
REVISION 9

DRG No. PB1586-SK92



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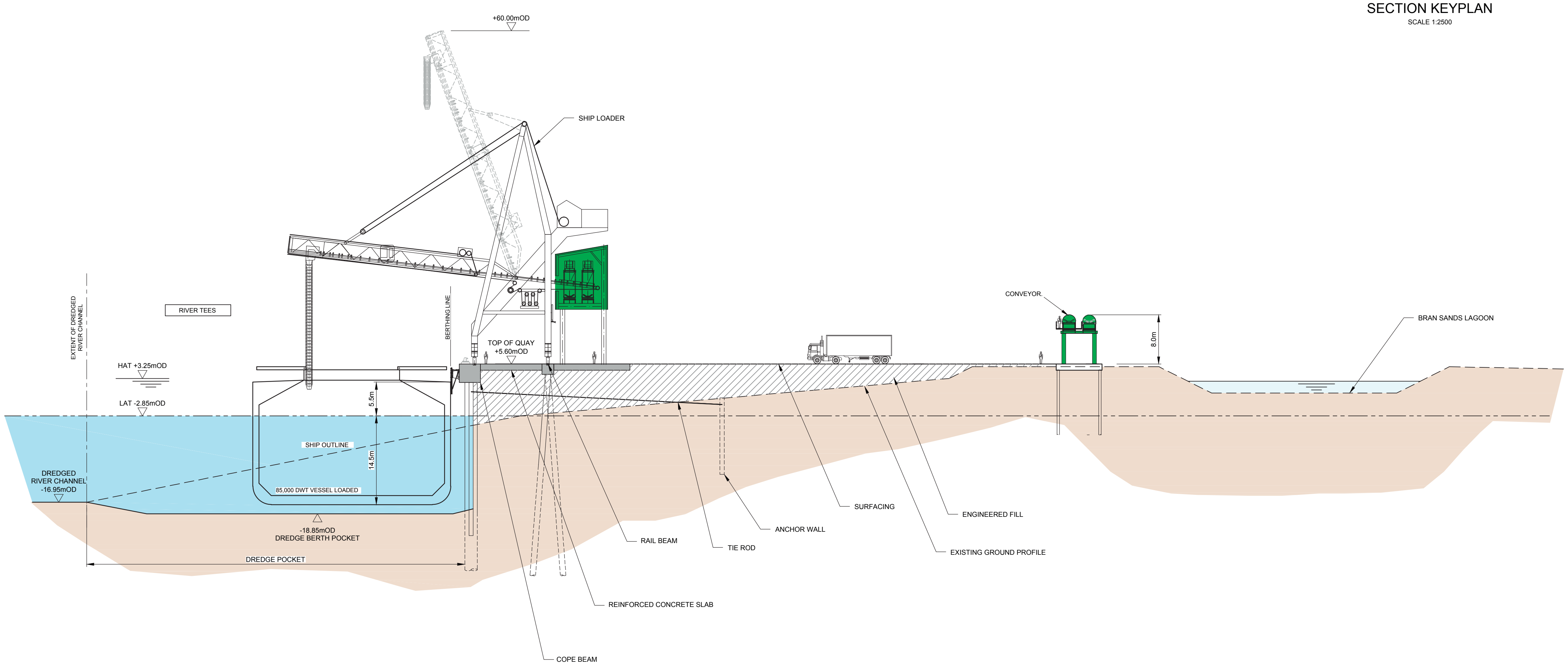

CROSS SECTION OF SOLID QUAY
(SEE SK91)

NOTES

1. THIS IS A CROSS SECTION WHICH DOESN'T SHOW FULL VISUAL BACKGROUND.

LEGEND

- - - - EXISTING GROUND PROFILE
CONVEYORS

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DRAWING No. PB1586-SK92 REVISION 8

3.1.30 Within the area that would require dredging in the current approach channel, the existing depth of the channel is 10.4m bCD (-13.25mOD). It is proposed that the approach channel in this area would be deepened to 14.1m bCD (-16.95mOD) to match the depth of the remainder of the approach channel downstream of this point to the mouth of the Tees. The approach channel dredging required would be the same for both the open quay structure and solid quay structure.

3.1.31 The existing level of the seabed within the footprint of the proposed berth pocket and between the proposed berth pocket and the shoreline varies between approximately 0.9m CD (-1.95mOD) and approximately 11.6m bCD (-14.45mOD). It is proposed that dredging to 16m bCD (-18.85mOD) would be undertaken to create the berth pocket.

3.1.32 **Table 3-2** summarises the proposed capital dredging material quantities, split by material type, for Phases 1 and 2 of the construction of the proposed open quay. For this option, the total quantity of material to be dredged would be approximately 1,122,000m^3. The construction of the solid quay option would involve capital dredging of approximately 814,000m^3, because less material would require dredging from within the footprint of the quay structure compared with the open quay construction (**Table 3-3** provides a summary comparison of dredged material volumes for the open and solid quay options).

Dredge material type and likely dredge plant required

3.1.33 The available geotechnical information suggests that the level of the top of the bedrock changes significantly along the Bran Sands river frontage, being at 7.15m bCD (-10mOD) at the upstream end (adjacent to the NWL Sludge Jetty) and at 27.15m bCD (-30mOD) at the downstream end. It is understood that the change in level occurs as a relatively steep step at approximately the centre point of the Bran Sands river frontage. The exact position of the change in bedrock level will be confirmed by undertaking ground investigation works during the detailed design phase.

Table 3-2 Summary of capital dredged material quantities (m^3) and material types for Phases 1 and 2 (open quay configuration)

	Silts	**Sands and Gravels**	**Clays**	**Mercia Mudstone**	**TOTAL**
Phase 1	155,000	300,000	180,000	115,000	**750,000**
Phase 2	26,000	26,000	50,000	270,000	**372,000**
Total (Phase 1 + Phase 2)	**181,000**	**326,000**	**230,000**	**385,000**	**1,122,000**

Table 3-3 Summary of dredged material volumes for the open quay and solid quay options

Material type	**Open quay (m^3)**	**Solid quay (m^3)**
Silts	181,000	66,000
Sands and Gravels	326,000	196,000
Clays	230,000	194,000
Mercia Mudstone	385,000	358,000
TOTAL	**1,122,000**	**814,000**

3.1.34 In the downstream section, existing borehole logs indicate that the required dredging would be entirely within the silts, sands, gravels and clays. In the upstream section, the dredging would generally require the removal of bedrock (marl). Consequently, the majority of the Phase 1 dredging would be undertaken in the silts, sands, gravels and clays (as show in **Table 3-2**).

3.1.35 For Phases 1 and 2, it is proposed that dredging of the silts would be undertaken using enclosed grabs, due to the elevated concentrations of contaminants present within the sediment (see **Section 7.4**). **Table 3-2** shows that 181,000m^3 of silts would require dredging by this method. The underlying sands and gravels below the silt layer represent the geological horizon; however, as a precautionary approach (given that further ground investigation is proposed), the EIA assumes dredging 181,000m^3 + the top 15% of the material below the silts (i.e. 208,150m^3) using an enclosed grab.

3.1.36 Capital dredging of the sands and gravels is likely to be undertaken by Trailing Suction Hopper Dredger (TSHD) in Phase 1, due to the relatively large quantity of this material type. It is envisaged that either a backhoe dredger, TSHD or Cutter Suction Dredger (CSD) could be used for dredging the clay and Mercia mudstone (marl) for Phases 1 and 2 (and sand and gravels for Phase 2).

3.1.37 Given the variety of dredge methods that could be employed by a dredging contractor, the EIA has made predictions of sediment suspension and dispersion using each dredge method, with the impact assessment for water quality, marine ecology, fisheries and waterbird populations undertaken based on the worst case predictions (in terms of predicted increases is suspended sediment concentrations and the spatial extent of the sediment plume).

Use and disposal of dredged material

3.1.38 As described in **Section 2**, the Waste Framework Directive includes a general duty to ensure that waste is dealt with in an environmentally friendly manner. In accordance with the Directive, it is necessary to seek alternative uses for the dredged material prior to the consideration of options for disposal. Consideration of alternative uses for dredged arisings is an integral part of the licensing process.

3.1.39 The proposed capital dredging would generate silts, sands, gravels, clay and rock, and the potential to use these materials (prior to proposing offshore disposal) has been considered. Alternative uses can include habitat creation or improvement and use in reclamation projects.

3.1.40 The initial, favoured option of ‘prevention’, according to the waste hierarchy (i.e. not creating the waste material) is not available in this case given the need to dredge the approach channel and to create a berth pocket for vessels. The volume of the dredge, however, has been optimised to the minimum level that achieves the required vessel access.

3.1.41 The following describes the proposals for alternative uses and disposal of the dredged material for each material type that would arise. Although beneficial uses are limited to those identified below at the current time, options for beneficial use would continue to be sought (i.e. if another operator expresses an interest in using the material) up to the point of dredging.

Re-use or disposal of silt

3.1.42 As noted above, silt to be dredged during Phase 1 and 2 is contaminated. **Appendix 3.1** sets out the options available for the management of the contaminated dredged material.

Use of sands and gravels in habitat enhancement proposals in Bran Sands lagoon

3.1.43 It is proposed that some of the sand and gravel from capital dredging during Phase 1 would be used within Bran Sands lagoon as part of habitat enhancement proposals that form part of the proposed scheme.

3.1.44 The habitat enhancement proposals (shown on **Drawings PB1586-SK466** and **PB1586-SK677**) would comprise the placement of dredged material within the lagoon to raise bed level in order to create a new shallow area of water and intertidal margins and, therefore, provide a feeding habitat for waterbirds (detailed further below). A layer of finer maintenance dredged material (mud), of up to 20cm in depth, would be placed over the sand and gravel to enhance the value of the area for feeding waterbirds. To prevent migration of the placed capital and maintenance dredged material from the deposition area across Bran Sands lagoon, a bund of dredged clay or mudstone would be placed, with the sand, gravel and maintenance dredged material to be placed behind the bund.

3.1.45 Sands and gravels would also be scattered onto the surface of the clay islands that also form part of the habitat enhancement proposals (see below).

3.1.46 The total volume of sand and gravels that would be used in the habitat enhancement would be approximately 15,000m^3 to 20,000m^3, representing a small proportion of the sands and gravels that would be dredged as part of the proposed scheme. The volume of material to be used within the habitat enhancement proposals was identified through an assessment of the area of habitat which would be impacted by the development of the port terminal. The area of habitat to be enhanced within the lagoon (using the approximate volumes of material stated above) would be approximately 50% greater than the intertidal area which would be lost as a result of the scheme (3.6ha). It is therefore considered that the habitat enhancement proposals would mitigate for the loss of the intertidal area at the location of the port terminal and provide a net enhancement. (discussed further within **Section 8** and **Section 9**).

Use of clay / mudstone in habitat enhancement proposals in Bran Sands lagoon

3.1.47 A proportion of the capital dredged clay and mudstone would be used to create a series of islands in Bran Sands lagoon to provide roosting and nesting habitat for waterbirds. The volume of clay / mudstone that would be used to create islands would be approximately 3,000m^3 to 5,000m^3, depending on the number and size of islands that are created. Sands and gravels would be scattered onto the surface of the islands to provide a more suitable substrate for use by waterbirds.

3.1.48 Clay / mudstone would also be used to create the bund that would retain placed sands, gravels and maintenance dredged material, described above.

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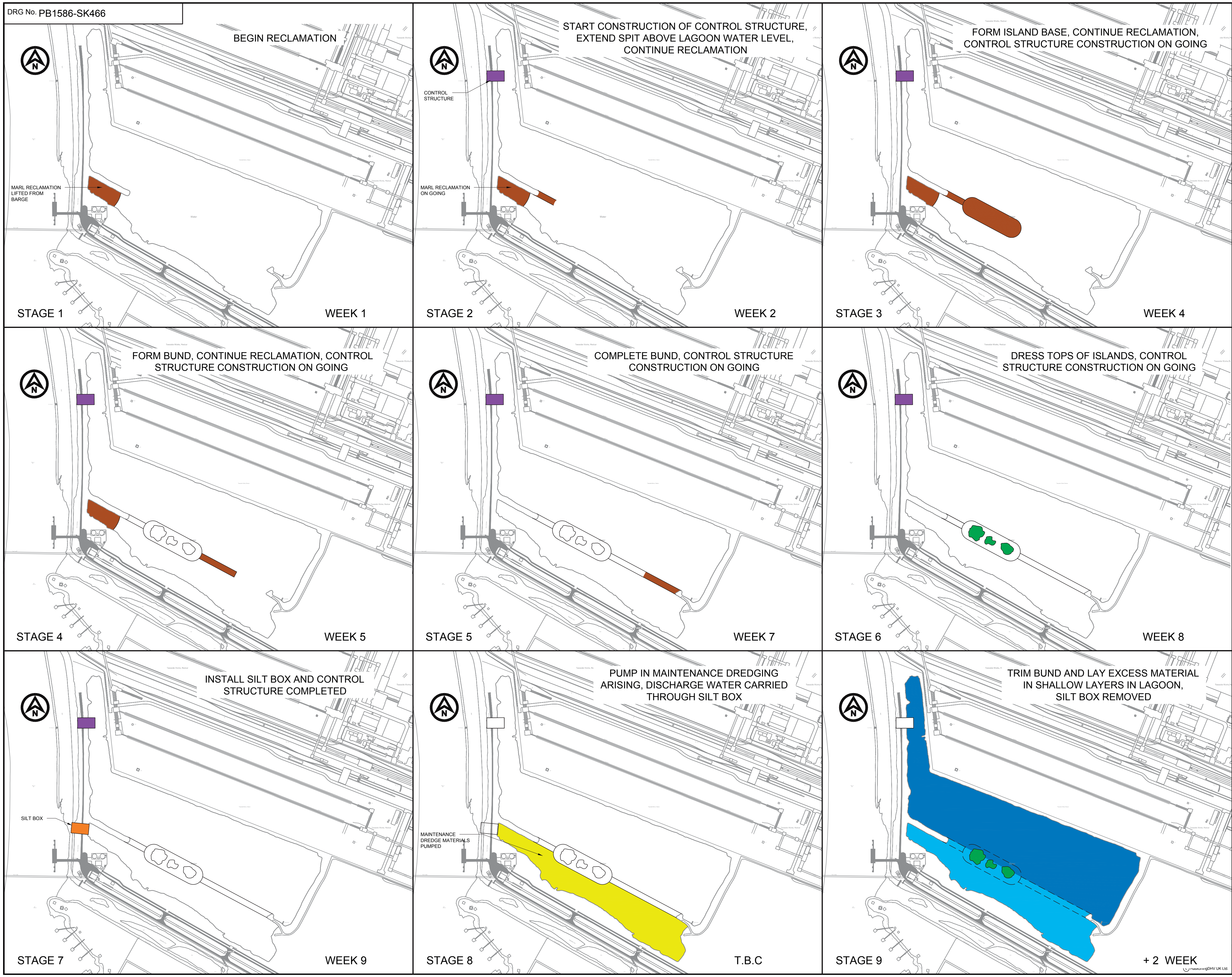

NOTES

1. THE TOP SURFACE AREA OF THE ISLANDS IS APPROXIMATELY 3,500m²
2. MAX HEIGHT OF ISLANDS TO BE +4.00mOD.
3. THIS DRAWING IS ONLY INTENDED TO BE ILLUSTRATIVE OF THE FINAL SCHEME. SIZES AND POSITIONS OF THE VARIOUS ELEMENTS ARE SUBJECT TO FURTHER REVISION.
4. THIS DRAWING HAS BEEN PRODUCED TO ILLUSTRATE ONE POSSIBLE METHOD OF DELIVERING THE PROPOSED ENVIRONMENTAL ENHANCEMENTS TO THE BRAN SANDS LAGOON. HOWEVER, THE AREA AND HEIGHT PARAMETERS STATED WILL APPLY REGARDLESS OF HOW THE PROPOSALS ARE IMPLEMENTED.

REV	DATE	DESCRIPTION	BY	CHK	APP
F	12-03-15	FOR APPROVAL	SA	RWP	RWP
E	11-02-15	FOR APPROVAL	SA	RWP	RWP
D	09-02-15	FOR APPROVAL	SA	RWP	RWP
C	30-01-15	FOR APPROVAL	SA	RWP	RWP
B	28-01-15	FOR APPROVAL	SA	RWP	RWP
A	21-01-15	FOR APPROVAL	SA	RWP	RWP

REVISIONS

YORKPOTASH
A Sirius Minerals Project

PROJECT
YORK POTASH
HARBOUR FACILITIES

TITLE
BRAN SANDS LAGOON
PROPOSED HABITAT
ENHANCEMENT
DELIVERY METHODOLOGY

Royal HaskoningDHV
Enhancing Society Together
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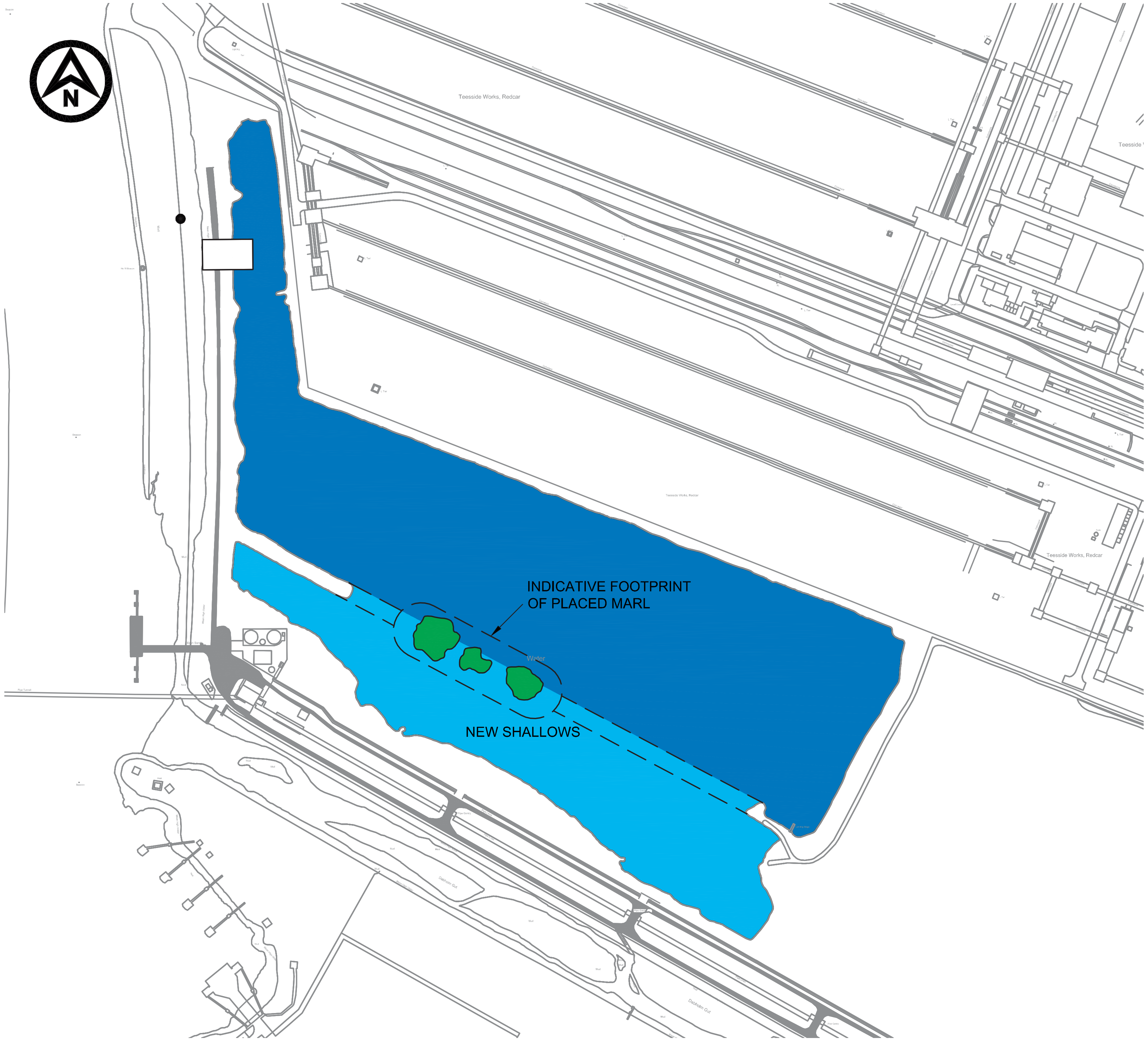
DRAWN SA	CHECKED	PASSED
DATE 21/01/15	CLIENT'S REF.	
SCALE AT A1 1:5000	AUTOCAD REF. PB1586-SK466	

DRAWING No. PB1586-SK466
REVISION F

DRG No. PB1586-SK467



KEY

(light blue)	PROPOSED NEW SHALLOWS
(dark blue)	OPEN WATER OF THE LAGOON
(green)	PROPOSED ISLANDS

NOTES

1. THE TOP SURFACE AREA OF THE ISLANDS IS APPROXIMATELY 3,500m².
2. MAX HEIGHT OF ISLANDS TO BE +4.00mOD.
3. APPROXIMATE AREA OF NEW SHALLOWS IS 5.40ha.
4. THIS DRAWING IS ONLY INTENDED TO BE ILLUSTRATIVE OF THE FINAL SCHEME. SIZES AND POSITIONS OF THE VARIOUS ELEMENTS ARE SUBJECT TO FURTHER REVISION.
5. THIS DRAWING HAS BEEN PRODUCED TO ILLUSTRATE ONE POSSIBLE METHOD OF DELIVERING THE PROPOSED ENVIRONMENTAL ENHANCEMENTS TO THE BRAN SANDS LAGOON. HOWEVER, THE AREA AND HEIGHT PARAMETERS STATED WILL APPLY REGARDLESS OF HOW THE PROPOSALS ARE IMPLEMENTED.

REV	DATE	DESCRIPTION	BY	CHK	APP
A	12.03.15	ISSUED FOR APPROVAL	CH	MS	RWP

REVISIONS

YORKPOTASH
A Sirius Minerals Project

PROJECT

YORK POTASH

TITLE

BRAN SANDS LAGOON
PROPOSED HABITAT
ENCHANCEMENT

Royal HaskoningDHV
Enhancing Society Together

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DRAWN	CH	CHECKED	MS	PASSED	RWP
DATE	MAR '15	CLIENT'S REF.			
SCALE AT A3	1:5000	AUTOCAD REF.	PB1586-SK467		

DRAWING No. PB1586-SK467
REVISION A

Use of sands and gravels in reclamation

3.1.49 Should the solid (reclamation) quay configuration option be progressed, some of the balance of sands and gravels that are not used within the habitat enhancement proposals in Bran Sands lagoon would be utilised within the construction of the port terminal. Given that two options for the construction of the port terminal are under consideration (the second option being an open piled structure, which would not comprise use of sands and gravels from capital dredging for construction purposes), and no other known uses for this material currently exist (above that required for habitat enhancement), the use of sands and gravels in the construction phase cannot be guaranteed. Consequently, it has been assumed for the purposes of assessment that offshore disposal of sands and gravels would be necessary.

Offshore disposal dredged material

3.1.50 There are two active disposal sites that potentially could accept dredged material: Tees Bay A (TY 160) and Tees Bay C (TY 150) (see **Figure 3-1** below). Tees Bay C has predominantly been used in the past for capital dredged material, but has received quantities of maintenance material in some years. Tees Bay A (the site closest to the shore) has been used in the past for soft non-cohesive maintenance material (ABPmer, 2005, cited in Royal Haskoning, 2006). DEFRA records from Tees Bay C show periodic small scale usage with a peak volume deposited in 1999 totalled some 1.9 million wet tonnes. However, the usual yearly volume is 0.1 million wet tonnes, with some years showing no usage at all.

3.1.51 As described above, it is proposed that some of the capital dredged sands, gravels, clay and mudstone would be used as part of the habitat enhancement proposals in Bran Sands lagoon. However, the volume of capital dredged material required for these proposals is relatively minor in the context of the quantity of material to be dredged as part of the proposed scheme and is subject to the detailed design of the proposals. Furthermore, the potential use dredged sands and gravels for construction purposes is dependent on whether the solid (reclamation) quay configuration is progressed.

3.1.52 Given the above, it has been assumed for the DCO and for the purposes of assessment of the disposal of dredged material, that the following maximum quantity of capital dredged material would be disposed of at the capital dredged material disposal site (Tees Bay C):

- Sands and gravels: 326,000m^3.
- Clays: 230,000m^3.
- Mercia Mudstone: 385,000m^3.

3.1.53 As described above, all capital dredged silt is considered to be contaminated and would not, therefore, be disposed offshore.

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